What is claimed is:

1. A method of optically switching a signal the method comprising:

placing a dielectric microsphere capable of WGM resonance for a specific wavelength of light, with a voltage alterable steady state index of refraction "n" substantially similar to the index of refraction of a first and a second optical fiber, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

placing a pair of electrodes on either side of the dielectric microsphere;

passing voltage, adequate to alter the steady state index of refraction "n" of the dielectric microsphere, through the pair of electrodes;

providing the specific wavelength of light, the dielectric microsphere resonates for, as a signal within the first optical fiber;

terminating the voltage whereby the index of refraction "n" of the dielectric microsphere returns to its steady state;

switching the signal from the first optical fiber across the dielectric microsphere to the second optical fiber; and,

reapplying the voltage.

2. A method of optically switching a signal the method comprising:

placing a dielectric microsphere capable of WGM resonance for a specific wavelength of light, with a voltage alterable steady state index of refraction "n" substantially dissimilar to the index of refraction of a first and a second optical fiber, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

placing a pair of electrodes on either side of the dielectric microsphere;

What is claimed is:

1. A method of optically switching a signal the method comprising:

placing a dielectric microsphere capable of WGM resonance for a specific wavelength of light, with a voltage alterable steady state index of refraction "n" substantially similar to the index of refraction of a first and a second optical fiber, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

placing a pair of electrodes on either side of the dielectric microsphere;

passing voltage, adequate to alter the steady state index of refraction "n" of the dielectric microsphere, through the pair of electrodes;

providing the specific wavelength of light, the dielectric microsphere resonates for, as a signal within the first optical fiber;

terminating the voltage whereby the index of refraction "n" of the dielectric microsphere returns to its steady state;

switching the signal from the first optical fiber across the dielectric microsphere to the second optical fiber; and,

reapplying the voltage.

2. A method of optically switching a signal the method comprising:

placing a dielectric microsphere capable of WGM resonance for a specific wavelength of light, with a voltage alterable steady state index of refraction "n" substantially dissimilar to the index of refraction of a first and a second optical fiber, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

placing a pair of electrodes on either side of the dielectric microsphere;

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providing the specific wavelength of light the dielectric microsphere resonates for, as a signal within the first optical fiber;

passing voltage adequate to alter the steady state index of refraction "n" of the dielectric microsphere, to become substantially similar to the index of refraction of the optical fibers, through the pair of electrodes;

switching the signal from the first optical fiber across the dielectric microsphere to the second optical fiber; and,

terminating the voltage whereby the index of refraction "n" of the dielectric microsphere returns to its steady state.

3. A method of optical routing signals the method comprising:

providing a first optical fiber with an unclad or thinly clad region;

providing a second optical fiber with an unclad or thinly clad region;

placing two or more dielectric microspheres each capable of WGM resonance for a specific wavelength of light and each with a voltage alterable steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

placing a pair of electrodes on either side of each dielectric microsphere;

passing voltage adequate to alter the steady state index of refraction "n" of each dielectric microsphere through the pair of electrodes;

providing a plurality of signals, each of a different wavelength, within an optical band in the first optical fiber;

selecting a signal to switch;

selecting the dielectric microsphere which resonates in WGM for the selected signal and terminating the voltage applied thereto, whereby the index of refraction "n" of the selected dielectric microsphere returns to its steady state;

switching the selected signal in the first optical fiber to the second optical fiber by the WGM resonance of the selected dielectric microsphere; and,

reapplying the voltage to the selected dielectric microsphere.

4. A method of optical routing signals the method comprising:

providing a first optical fiber with an unclad or thinly clad region;

providing a second optical fiber with an unclad or thinly clad region;

placing two or more dielectric microspheres each capable of WGM resonance for a specific wavelength of light and each with a voltage alterable steady state index of refraction "n" dissimilar to the index of refraction of the optical fibers, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

placing a pair of electrodes on either side of each dielectric microsphere;

providing a plurality of signals, each of a different wavelength, within an optical band in the first optical fiber;

selecting a signal to switch;

selecting the dielectric microsphere which resonates in WGM for the selected signal and applying voltage to it, across the pair of electrodes, whereby the steady state index of refraction "n" of the selected dielectric microsphere is altered to become substantially similar to the index of refraction of the optical fibers;

switching the selected signal in the first optical fiber to the second optical fiber by the WGM resonance of the selected dielectric microsphere; and,

terminating the voltage applied to the selected dielectric microsphere.

5. An optical switch comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a voltage alterable steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers; and

a pair of electrodes on either side of the dielectric microsphere.

6. An optical switch comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a voltage alterable steady state index of refraction "n" dissimilar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers; and

a pair of electrodes on either side of the dielectric microsphere.

7. An optical router comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a plurality of optical switches each comprising;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a voltage alterable steady state index of refraction "n" dissimilar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers; and,

a pair of electrodes on either side of the dielectric microsphere.

8. An optical router comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a plurality of optical switches each comprising;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a voltage alterable steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers; and,

a pair of electrodes on either side of the dielectric microsphere.

9. A method of optically switching a signal the method comprising:

placing a dielectric microsphere capable of WGM resonance for a specific wavelength of light, with a light alterable steady state index of refraction "n" substantially similar to the index of refraction of a first and second optical fiber, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

directing a sufficiently intense beam of light at the microsphere, whereby its steady state index of refraction "n" is altered;

providing the specific wavelength of light the dielectric microsphere resonates for, as a signal within the first optical fiber;

terminating the sufficiently intense beam of light whereby the index of refraction "n" of the dielectric microsphere returns to its steady state;

switching the signal from the first optical fiber across the dielectric microsphere to the second optical fiber; and,

reapplying the sufficiently intense beam of light .

10. A method of optically switching a signal the method comprising:

placing a dielectric microsphere capable of WGM resonance for a specific wavelength of light, with a light alterable steady state index of refraction "n" dissimilar to the index of refraction of a first and second optical fiber, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

providing the specific wavelength of light the dielectric microsphere resonates for, as a signal within the first optical fiber;

directing a sufficiently intense beam of light at the microsphere whereby the index of refraction "n" of the dielectric microsphere becomes substantially similar to the index of refraction of the optical fibers;

switching the signal from the first optical fiber across the dielectric microsphere to the second optical fiber; and,

terminating the intense beam of light .

11. A method of optical routing signal the method comprising:

providing a first optical fiber with an unclad or thinly clad region;

providing a second optical fiber with an unclad or thinly clad region;

placing two or more dielectric microsphere each capable of WGM resonance for a specific wavelength of light and each with a light alterable steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

directing a sufficiently intense beam of light at each dielectric microsphere, whereby the steady state index of refraction "n" is altered;

providing a plurality of signals, each of a different wavelength, within an optical band in the first optical fiber;

selecting a signal to switch;

selecting the dielectric microsphere and terminating the sufficiently intense beam of light applied thereto, whereby the index of refraction "n" of the dielectric microsphere returns to its steady state;

switching the selected signal in the first optical fiber to the second optical fiber by the WGM resonance of the selected dielectric microsphere ; and,

reapplying the sufficiently intense beam of light to the selected dielectric microsphere.

12. A method of optical routing signal the method comprising:

providing a first optical fiber with an unclad or thinly clad region;

providing a second optical fiber with an unclad or thinly clad region;

placing two or more dielectric microspheres each capable of WGM resonance for a specific wavelength of light and each with a light alterable steady state index of refraction "n" dissimilar to the index of refraction of the optical fibers, in close proximity with the unclad or thinly clad regions of the first and second optical fibers;

providing a plurality of signals, each of a different wavelength, within an optical band in the first optical fiber;

selecting a signal to switch;

selecting the dielectric microsphere and directing a sufficiently intense beam of light applied thereto, whereby the index of refraction "n" of the dielectric microsphere becomes substantially similar to the index of refraction of the optical fibers;

switching the selected signal in the first optical fiber to the second optical fiber by the WGM resonance of the selected dielectric microsphere; and,

terminating the sufficiently intense beam of light directed at the selected dielectric microsphere.

13. An optical switch comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a light alterable steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers;

an illuminating fiber with a first end directed at the dielectric microsphere and a second end adapted to receive a laser beam; and,

a Mach-Zender interferometer placed between the first and second end of the illuminating fiber.

14. An optical switch comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a light alterable steady state index of refraction "n" substantially dissimilar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers;

an illuminating fiber with a first end directed at the dielectric microsphere and a second end adapted to receive a laser beam;

a Mach-Zender interferometer placed between the first and second end of the illuminating fiber.

15. An optical router comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a plurality of optical switches each comprising;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a light alterable steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers;

an illuminating fiber with a first end directed at the dielectric microsphere and a second end adapted to receive a laser beam;

a Mach-Zender interferometer placed between the first and second end of the illuminating fiber.

16. An optical router comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a plurality of optical switches each comprising;

a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a light alterable steady state index of refraction "n" substantially dissimilar to the index of refraction of the optical fibers, in a fixed proximity to the unclad or thinly clad regions of the first and second optical fibers;

an illuminating fiber with a first end directed at the dielectric microsphere and a second end adapted to receive a laser beam;

a Mach-Zender interferometer placed between the first and second end of the illuminating fiber.

17. A method of optically switching a signal the method comprising:

providing a first optical fiber with an unclad or thinly clad region;

providing a second optical fiber with an unclad or thinly clad region;

containing a dielectric microsphere capable of WGM resonance for a specific wavelength of light with a steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, within an optical trap;

providing the specific wavelength of light as a signal within the first optical fiber;

moving the dielectric microsphere contained within the optical trap in close proximity with an unclad or thinly clad region of the optical fibers;

switching the signal from the first optical fiber across the dielectric microsphere to the second optical fiber; and,

moving the dielectric microsphere contained within the optical trap out of close proximity with the unclad or thinly clad region optical fibers .

18. A method of optically routing a signal the method comprising:

providing a first optical fiber with an unclad or thinly clad region;

providing a second optical fiber with an unclad or thinly clad region;

containing two or more dielectric microspheres, each capable of WGM resonance for a specific wavelength of light and each with a steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers, each within an optical trap;

providing a plurality of signals, each of a different wavelength, within a channel in the first optical fiber;

selecting a signal to switch;

moving a dielectric microsphere, which can resonate in WGM for the selected signal, contained within an optical trap into close proximity with the unclad or thinly clad region of the optical fibers; and

switching the signal via WGM across the dielectric microsphere to the second optical fiber; and,

moving the selected dielectric microsphere out of close proximity with the unclad or thinly clad region of the optical fibers.

19. An optical switch comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

an optical trap; and

a dielectric microsphere capable of WGM resonance for a specific wavelength of light contained within the optical trap which has a steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers.

20. An optical router comprising:

a first optical fiber with an unclad or thinly clad region;

a second optical fiber with an unclad or thinly clad region;

a plurality of optical traps; and

a plurality of dielectric microspheres each capable of WGM resonance for a specific wavelength of light and each contained within an optical trap which has a steady state index of refraction "n" substantially similar to the index of refraction of the optical fibers.

21. The method of claim 1 wherein the signal is within the wavelengths of an optical band within an optical network.

22. The method of claim 1 wherein the brief termination of voltage is for less than about 25 nanoseconds.

23. The method of claim 1 wherein the brief termination of voltage is for less than about 10 nanoseconds.

24. The method of claim 1 wherein the brief termination of voltage is for less than about 1 nanosecond.

25. The method of claim 1 wherein the brief termination of voltage is for less than about 900 picoseconds.

26. The method of claim 1 wherein the brief termination of voltage is for less than about 800 picoseconds.

27. The method of claim 1 wherein the brief termination of voltage is for less than about 700 picoseconds.

28. The method of claim 1 wherein the brief termination of voltage is for less than about 600 picoseconds.

29. The method of claim 1 wherein the brief termination of voltage is for less than about 500 picoseconds.

30. The method of claim 1 wherein the brief termination of voltage is for less than about 250 picoseconds.

31. The method of claim 1 wherein the brief termination of voltage is for less than about 125 picoseconds.

32. The method of claim 1 wherein the brief termination of voltage is for less than about 75 picoseconds.

33. The method of claim 1 wherein the brief termination of voltage is for less than about 50 picoseconds.

34. The method of claim 1 wherein the brief termination of voltage is for less than about 25 picoseconds.

35. The method of claim 1 wherein the brief termination of voltage is for less than about 10 picoseconds.

36. The method of claim 2 wherein the signal is within the wavelengths of an optical band within an optical network.

37. The method of claim 2 wherein the brief termination of voltage is for less than about 25 nanoseconds.

38. The method of claim 2 wherein the brief termination of voltage is for less than about 10 nanoseconds.

39. The method of claim 2 wherein the brief termination of voltage is for less than about 1 nanosecond.

40. The method of claim 2 wherein the brief termination of voltage is for less than about 900 picoseconds.

41. The method of claim 2 wherein the brief termination of voltage is for less than about 800 picoseconds.

42. The method of claim 2 wherein the brief termination of voltage is for less than about 700 picoseconds.

43. The method of claim 2 wherein the brief termination of voltage is for less than about 600 picoseconds.

44. The method of claim 2 wherein the brief termination of voltage is for less than about 500 picoseconds.

45. The method of claim 2 wherein the brief termination of voltage is for less than about 250 picoseconds.

46. The method of claim 2 wherein the brief termination of voltage is for less than about 125 picoseconds.

47. The method of claim 2 wherein the brief termination of voltage is for less than about 75 picoseconds.

48. The method of claim 2 wherein the brief termination of voltage is for less than about 50 picoseconds.

49. The method of claim 2 wherein the brief termination of voltage is for less than about 25 picoseconds.

50. The method of claim 2 wherein the brief termination of voltage is for less than about 10 picoseconds.

51. The method of claim 3 wherein at least one signal is within the wavelengths of an optical band within an optical network.

52. The method of claim 3 wherein the brief termination of voltage is for less than about 25 nanoseconds.

53. The method of claim 3 wherein the brief termination of voltage is for less than about 10 nanoseconds.

54. The method of claim 3 wherein the brief termination of voltage is for less than about 1 nanosecond.

55. The method of claim 3 wherein the brief termination of voltage is for less than about 900 picoseconds.

56. The method of claim 3 wherein the brief termination of voltage is for less than about 800 picoseconds.

57. The method of claim 3 wherein the brief termination of voltage is for less than about 700 picoseconds.

58. The method of claim 3 wherein the brief termination of voltage is for less than about 600 picoseconds.

59. The method of claim 3 wherein the brief termination of voltage is for less than about 500 picoseconds.

60. The method of claim 3 wherein the brief termination of voltage is for less than about 250 picoseconds.

61. The method of claim 3 wherein the brief termination of voltage is for less than about 125 picoseconds.

62. The method of claim 3 wherein the brief termination of voltage is for less than about 75 picoseconds.

63. The method of claim 3 wherein the brief termination of voltage is for less than about 50 picoseconds.

64. The method of claim 3 wherein the brief termination of voltage is for less than about 25 picoseconds.

65. The method of claim 3 wherein the brief termination of voltage is for less than about 10 picoseconds.

66. The method of claim 4 wherein at least one signal is within the wavelengths of an optical band within an optical network.

67. The method of claim 4 wherein the brief termination of voltage is for less than about 25 nanoseconds.

68. The method of claim 4 wherein the brief termination of voltage is for less than about 10 nanoseconds.

69. The method of claim 4 wherein the brief termination of voltage is for less than about 1 nanosecond.

70. The method of claim 4 wherein the brief termination of voltage is for less than about 900 picoseconds.

71. The method of claim 4 wherein the brief termination of voltage is for less than about 800 picoseconds.

72. The method of claim 4 wherein the brief termination of voltage is for less than about 700 picoseconds.

73. The method of claim 4 wherein the brief termination of voltage is for less than about 600 picoseconds.

74. The method of claim 4 wherein the brief termination of voltage is for less than about 500 picoseconds.

75. The method of claim 4 wherein the brief termination of voltage is for less than about 250 picoseconds.

76. The method of claim 4 wherein the brief termination of voltage is for less than about 125 picoseconds.

77. The method of claim 4 wherein the brief termination of voltage is for less than about 75 picoseconds.

78. The method of claim 4 wherein the brief termination of voltage is for less than about 50 picoseconds.

79. The method of claim 4 wherein the brief termination of voltage is for less than about 25 picoseconds.

80. The method of claim 4 wherein the brief termination of voltage is for less than about 10 picoseconds.

81. The optical switch of claim 5 wherein at least one of the thinly or unclad regions of the first and second optical fibers is tapered.

82. The optical switch of claim 6 wherein at least one of the thinly or unclad regions of the first and second optical fibers is tapered.

83. The optical router of claim 7 wherein at least one of the thinly or unclad regions of the first and second optical fibers is tapered.

84. The optical router of claim 8 wherein at least one of the thinly or unclad regions of the first and second optical fibers is tapered.

85. The method of claim 9 wherein the sufficiently intense beam of light is a laser beam.

86. The method of claim 9 wherein the signal is within the wavelengths of an optical band within an optical network.

87. The method of claim 85 wherein the laser beam passes through a Mach-Zender interferometer and the brief termination of the laser beam is controlled by the Mach-Zender interferometer.

88. The method of claim 87 wherein the brief termination of the laser beam is for less than about 25 nanoseconds.

89. The method of claim 87 wherein the brief termination of the laser beam is for less than about 10 nanoseconds.

90. The method of claim 87 wherein the brief termination of the laser beam is for less than about 1 nanosecond.

91. The method of claim 87 wherein the brief termination of the laser beam is for less than about 900 picoseconds.

92. The method of claim 87 wherein the brief termination of the laser beam is for less than about 800 picoseconds.

93. The method of claim 87 wherein the brief termination of the laser beam is for less than about 700 picoseconds.

94. The method of claim 87 wherein the brief termination of the laser beam is for less than about 600 picoseconds.

95. The method of claim 87 wherein the brief termination of the laser beam is for less than about 500 picoseconds.

96. The method of claim 87 wherein the brief termination of the laser beam is for less than about 250 picoseconds.

97. The method of claim 87 wherein the brief termination of the laser beam is for less than about 125 picoseconds.

98. The method of claim 87 wherein the brief termination of the laser beam is for less than about 75 picoseconds.

99. The method of claim 87 wherein the brief termination of the laser beam is for less than about 50 picoseconds.

100. The method of claim 87 wherein the brief termination of the laser beam is for less than about 25 picoseconds.

101. The method of claim 87 wherein the brief termination of the laser beam is for less than about 10 picoseconds.

102. The optical router of claim 10 wherein at least one of the thinly or unclad regions of the first and second optical fibers is tapered.

103. The method of claim 10 wherein the signal is within the wavelengths of an optical band within an optical network.

104. The method of claim 10 wherein the sufficiently intense beam of light is a laser beam.

105. The method of claim 104 wherein the laser beam passes through a Mach-Zender interferometer and the directing of the laser beam at the microsphere is controlled by the Mach-Zender interferometer.

106. The method of claim 105 wherein the brief termination of voltage is for less than about 25 nanoseconds.

107. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 10 nanoseconds.

108. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 1 nanosecond.

109. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 900 picoseconds.

110. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 800 picoseconds.

111. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 700 picoseconds.

112. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 600 picoseconds.

113. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 500 picoseconds.

114. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 250 picoseconds.

115. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 125 picoseconds.

116. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 75 picoseconds.

117. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 50 picoseconds.

118. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 25 picoseconds.

119. The method of claim 105 wherein the laser beam is directed at the microsphere for less than about 10 picoseconds.

120. The method of claim 11 wherein each sufficiently intense beam of light is a laser beam.

121. The method of claim 11 wherein the signal is within the wavelengths of an optical band within an optical network.

122. The method of claim 120 wherein each laser beam passes through a Mach-Zender interferometer and the termination is of each laser beam is controlled by the Mach-Zender interferometer.

123. The method of claim 12 wherein each sufficiently intense beam of light is a laser beam.

124. The method of claim 12 wherein the signal is within the wavelengths of an optical band within an optical network.

125. The method of claim 123 wherein each laser beam passes through a Mach-Zender interferometer and the directing of the laser beam at the microsphere is controlled by the Mach-Zender interferometer.

126. The optical switch of claim 13 further comprising a computer connected to the Mach-Zender interferometer, whereby the constructive or destructive interference the Mach-Zender interferometer can apply to a laser beam within the illuminating fiber is controlled.

127. The optical switch of claim 14 further comprising a computer connected to the Mach-Zender interferometer, whereby the constructive or destructive interference the Mach-Zender interferometer can apply to a laser beam within the illuminating fiber is controlled.

128. The optical router of claim 15 further comprising a computer connected to each Mach-Zender interferometer, whereby the constructive or destructive interference the Mach-Zender interferometer can apply to a laser beam within the illuminating fiber is controlled.

129. The optical router of claim 16 further comprising a computer connected to each Mach-Zender interferometer, whereby the constructive or destructive interference the Mach-Zender interferometer can apply to a laser beam within the illuminating fiber is controlled.

130. An optical filter comprising:

a WGM resonate structure fixed in a medium with a known index of refraction that is distinct from the index of refraction of the index of refraction of the WGM resonate structure;

an input waveguide affixed at a region proximate to the WGM resonate structure; and

an output waveguide affixed at a region proximate to the WGM resonate structure.

131. The optical filter of claim 130 further comprising a resonate structure-medium interface formed where the medium surrounds the WGM resonate structure.

132. The optical filter of claim 130 wherein the distinction between the indices of refraction of the WGM resonate structure and the medium is sufficient to cause a condition of total internal reflection.

133. The optical filter of claim 130 wherein the WGM resonate structure is selected from the group consisting of microspheres, stadiums, rings, hoops, oblate and prolate spheroids, or discs.

134. The optical filter of claim 130 wherein the WGM resonate structure is dielectric.

135. The optical filter of claim 130 wherein the WGM resonate structure is a microsphere.

136. The optical filter of claim 135 wherein the microsphere is between about 2 to about 90 micro in diameter.

137. The optical filter of claim 135 wherein the microsphere is between about 2 to about 75 microns in diameter.

138. The optical filter of claim 135 wherein the microsphere is between about 2 to about 50 microns in diameter.

139. The optical filter of claim 135 wherein the microsphere is between about 2 to about 29 microns in diameter.

140. The optical filter of claim 135 wherein the microsphere is between about 2 to about 25 microns in diameter.

141. The optical filter of claim 135 wherein the microsphere is between about 2 to about 19 microns in diameter.

142. The optical filter of claim 135 wherein the microsphere is between about 2 to about 9 microns in diameter.

143. The optical filter of claim 130 wherein the waveguide is selected from the group consisting of an optical fiber, a tapered optical fiber, a semi-conductor waveguide, a photonic band gap waveguide, or a photonic crystal waveguide.

144. The optical filter of claim 143 wherein the waveguide is an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

145. The optical filter of claim 143 wherein the optical fiber is tapered at the area of reduced cladding.

146. The optical filter of claim 130 wherein the medium has an index of refraction of about 1.52 and the WGM resonate structure has an index of refraction of greater than 1.5.

147. An optical filter comprising:

a WGM resonate structure fixed in a medium, with a known index of refraction that is distinct from the index of refraction of the index of refraction of the WGM resonate structure;

an input waveguide affixed at a region proximate to the WGM resonate structure;

an output waveguide affixed at a region proximate to the WGM resonate structure; and a means to switch "on/off" the optical filter.

148. The optical filter of claim 147 wherein a WGM resonate structure is a microsphere.

149. The optical filter of claim 148 wherein the microsphere is between about 2 to about 90 microns in diameter.

150. The optical filter of claim 148 wherein the microsphere is between about 2 to about 75 microns in diameter.

151. The optical filter of claim 148 wherein the microsphere is between about 2 to about 50 microns in diameter.

152. The optical filter of claim 148 wherein the microsphere is between about 2 to about 29 microns in diameter.

153. The optical filter of claim 148 wherein the microsphere is between about 2 to about 25 microns in diameter.

154. The optical filter of claim 148 wherein the microsphere is between about 2 to about 19 microns in diameter.

155. The optical filter of claim 148 wherein the microsphere is between about 2 to about 9 microns in diameter.

156. The optical filter of claim 148 wherein the microsphere is between about 2 to about 8 microns in diameter.

157. The optical filter of claim 147 further comprising a resonate structure-medium interface formed where the medium surrounds the WGM resonate structure.

158. The optical filter of claim 157 wherein the distinction between the indices of refraction of the WGM resonate structure and the medium is sufficient to cause a condition of total internal reflection at the resonate structure-medium interface.

159. The optical filter of claim 147 further comprising a resonate structure waveguide interface formed at each of the proximate regions.

160. The optical filter of claim 159 wherein the means to switch "on/off" the optical filter is the adjustment of the index of refraction of the WGM resonate structure at one or more of the resonate structure waveguide interfaces.

161. The optical filter of claim 160 wherein the adjustment of the index of refraction of the WGM resonate structure is electrical.

162. The optical filter of claim 161 further comprising:

a pair of electrodes, each with a conductive contact lead, placed on either side of the WGM resonate structure; and

a controller attached to the conductive leads, whereby the flow of electricity to the conductive leads can be selected.

163. The optical filter of claim 160 wherein the adjustment of the index of refraction of the WGM resonate structure is optical.

164. The optical filter of claim 163 further comprising a laser beam directed at the WGM resonate structure.

165. The optical filter of claim 164 further comprising a Mach-Zender interferometer to produce the laser beam.

166. The optical filter of claim 147 wherein the "on/off" means is a controlled signal loss within the WGM resonate structure.

167. The optical filter of claim 166 further comprising:

a triggerable signal absorbing material within the WGM resonate structure; and

a trigger means for activating the signal absorbing material.

168. The optical filter of claim 167 wherein the trigger means is an intense beam of light directed at the WGM resonate structure.

169. The optical filter of claim 168 wherein the intense beam of light is a laser beam.

170. The optical filter of claim 169 further comprising a Mach-Zender interferometer to produce the laser beam.

171. The optical filter of claim 159 wherein at least one of the waveguides is an optical fiber with a region of reduced cladding at the resonate structure waveguide interface.

172. The optical filter of claim 171 wherein at least one of the optical fibers is tapered.

173. The optical filter of claim 147 wherein at least one of the input and output waveguides is selected from the group consisting of a semi-conductor waveguide, a photonic band gap waveguide or a photonic crystal waveguide.

174. A system to demultiplex optical signals comprising

"n" wavelength specific optical filters, each containing a WGM resonate structure fixed in a medium, with a known index of refraction that is distinct from the index of refraction of the WGM resonate structure;

a single input waveguide fixed proximate to the optical filters, whereby optical signal can propagate from the input waveguide to a WGM resonate structure; and

"n" output waveguides, each fixed proximate to one of the "n" optical filters, whereby optical signals can propagate from an optical filter to the output waveguide.

175. The system of claim 172 wherein at least one of the WGM resonate structures is a microsphere.

176. The system of claim 172 wherein the WGM resonate structure are microspheres.

177. The system of claim 176 wherein the microsphere is between about 2 to about 90 microns in diameter.

178. The system of claim 176 wherein the microsphere is between about 2 to about 75 microns in diameter.

179. The system of claim 176 wherein the microsphere is between about 2 to about 50 microns in diameter.

180. The system of claim 176 wherein the microsphere is between about 2 to about 29 microns in diameter.

181. The system of claim 176 wherein the microsphere is between about 2 to about 25 microns in diameter.

182. The system of claim 176 wherein the microsphere is between about 2 to about 19 microns in diameter.

183. The system of claim 176 wherein the microsphere is between about 2 to about 9 microns in diameter.

184. The system of claim 174 further comprising an electronic "on/off" means for adjusting the index of refraction of at least one of the WGM resonate structures.

185. The system of claim 184 wherein the electronic "on/off" means comprises:

a pair of electrodes, each with a conductive lead, placed on either side of the WGM microsphere, whereby electrical power can pass across the microsphere; and

a controller attached to the conductive leads, whereby the flow of electricity to the conductive leads can be selected.

186. The system of claim 174 further comprising an optical "on/off" means for adjusting the index of refraction of at least one microsphere.

187. The system of claim 186 wherein the optical means is a laser beam directed at the microsphere within the at least one optical switch.

188. The system of claim 187 further comprising at least one Mach-Zender interferometer to produce each laser beam.

189. The system of claim 174 further comprising:

a triggerable signal absorbing material within at least one WGM resonate structure; and

a trigger means for activating the signal absorbing material within the at least one WGM resonate structure.

190. The system of claim 189 wherein the signal absorbing material is photochromic

191. A method of optical filtering comprising:

forming a resonate structure-medium interface by surrounding a WGM resonate structure with a medium that has an index of refraction distinct from the index of refraction of the WGM resonate structure;

establishing a condition of total internal reflection from the difference between the indexes of refraction of the medium and the WGM resonate structure at the resonate structure medium interface to.

providing a plurality of input optical signals within a predetermined optical band to the WGM resonate structure;

coupling at least one optical signal which is a resonate signal of the WGM resonate structure to the WGM resonate structure ;

providing the at least one optical signal from the dielectric WGM resonate structure as an output optical signal.

192. The method of claim 191 the method further comprising:

providing the input signals within a waveguide fixed at a region proximate to the WGM resonate structure;

providing an output waveguide to receive the output fixed at a region proximate to the WGM resonate structure to receive the output optical signals.

193. The method of claim 192 the method further comprising forming a resonate structure-wavelength interface at each proximate region.

194. The method of claim 193 further comprising switching the filter "on/off" by applying a WGM control to at least one resonate structure-waveguide interface.

195. The method of claim 194 wherein the applied WGM control is the polarization of a resonate structure.

196. The method of claim 195 wherein the polarization adjusts the index of refraction of the WGM resonate structure, at one or more resonate structure-waveguide interfaces, to become substantially equal to the index of refraction of the medium.

197. The method of claim 195 wherein the polarization adjusts the index of refraction of the WGM resonate wave structure whereby it no longer resonates for optical signals within the predetermined optical band.

198. The method of claim 195 wherein the polarization is caused by passing electrical power across the WGM resonate structure.

199. The method of claim 195 wherein the polarization is produced by directing an intense beam of light at the resonate structure.

200. The method of claim 192 the method further comprising adding the optical signal to the output waveguide.

201. The method of claim 193 the method further comprising switching the filter "on/off" by a signal loss control.

202. The method of claim 201 wherein the signal loss control is selectively applying a trigger to activate the signal absorbing material within the WCM resonate structure whereby WGM is disrupted by the signal loss.

203. A method to demultiplex optical signals comprising:

providing "n" optical signals of different wavelengths, in a single input waveguide to "n" optical filters, each of the "n" optical filters containing a WGM resonate structure surrounded by a medium, which resonates in WGM for one of the "n" optical signals;

coupling the corresponding optical signal from the output waveguide to each optical filter; and

providing as output from each of the "n" optical filters one of the "n" optical signals.

204. The method to demultiplex of claim 203 the method further comprising coupling the output from each of the "n" optical filters to one of the "n" output waveguides.

205. An optical filter comprising:

a WGM resonate structure; and,

a triggerable signal absorbing material within the substrate of the WGM resonate structure.

206. The optical filter of claim 205 further comprising a trigger means which can cause the signal absorbing material to absorb signal.

207. The optical filter of claim 206 wherein the trigger means is an intense beam of light directed at the resonate structure.

208. The optical filter of claim 205 wherein the resonate structure is selected from the group consisting of microspheres, stadiums, rings, hoops, oblate and prolate spheroids, and discs.

209. The optical filter of claim 205 wherein the resonate structure is dielectric.

210. The optical filter of claim 209 wherein the dielectric resonate structure is a microsphere.

211. The optical filter of claim 210 wherein the microsphere is between about 10 to 200 microns in diameter.

212. The optical filter of claim 210 wherein the microsphere is less than about 30 microns.

213. The optical filter of claim 210 wherein the microsphere is less than about 10 microns.

214. The optical filter of claim 205 wherein the signal absorbing material is a photochromic material.

215. The optical filter of claim 214 wherein the photochromic material is photochromic bisthienylethene.

216. The optical filter of claim 207 wherein the intense beam of light is a laser beam.

217. An optical filter comprising:

an input waveguide;

a secondary structure which supports signal propagation;

a WGM resonate structure fixed at a region proximate to the input waveguide and the secondary structure; and,

a triggerable signal absorbing material within the WGM resonate structure.

218. The optical filter of claim 217 further comprising a trigger means for activating the signal absorbing material within the WGM resonate structure.

219. The optical filter of claim 217 further comprising a resonate structure-waveguide interface formed at each of the proximate regions.

220. The optical filter of claim 217 wherein the trigger means is an intense beam of light directed at the WGM resonate structure.

221. The optical filter of claim 217 wherein the WGM resonate structure is selected from the group consisting of microspheres, stadiums, rings, hoops, oblate and prolate spheroids, and discs.

222. The optical filter of claim 217 wherein the resonate structure is dielectric.

223. The optical filter of claim 222 wherein the dielectric resonate structure is a microsphere.

224. The optical filter of claim 223 wherein the microsphere is between about 10 to 200 microns in diameter.

225. The optical filter of claim 223 wherein the microsphere is less than about 30 microns.

226. The optical filter of claim 223 wherein the microsphere is less than about 10 microns.

227. The optical filter of claim 223 wherein the signal absorbing material is a photochromic material.

228. The optical filter of claim 227 wherein the photochromic material is photochromic bisthienylethene.

229. The optical filter of claim 220 wherein the intense beam of light is a laser beam.

230. The optical filter of claim 217 wherein the input waveguide is an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

231. The optical filter of claim 230 wherein the optical fiber is tapered at the area of reduced cladding.

232. The optical switch of claim 217 wherein the secondary structure is selected from the group consisting of a waveguide, an optical fiber, a tapered optical fiber, a semi-conductor waveguide, a photonic band gap waveguide, and a photonic crystal waveguide.

233. The optical switch of claim 229 further comprising a Mach-Zender interferometer to produce the laser beam.

234. A system to demultiplex optical signals:

"n" groups of optical filters, each of which contains a WGM resonate structure which resonates in WGMfor the a different resonate signal;

an input waveguide fixed at a region proximate to each of the "n" optical filters, whereby optical signal propagation from the input waveguide to the optical filter can occur;

a triggerable signal absorbing material within at least one of the WGM resonate structures; and

"n" output waveguides each fixed at a region proximate to one of the "n" optical filters, whereby optical signal propagation from the optical filter to the output waveguide can occur.

235. The system of claim 234 further comprising a resonate structure-waveguide interface formed at each of the proximate regions.

236. The system of claim 234 further comprising a trigger consisting of an intense beam of light applied to at least one resonate structure which contains signal absorbing material.

237. The system of claim 236 wherein the intense beam of light is a laser beam.

238. The system of claim 237 further comprising at least one Mach-Zender interferometer to produce each laser beam.

239. The system of claim 234 wherein the resonate structure is selected from the group consisting of microspheres, stadiums, rings, hoops, oblate and prolate spheroids, and discs.

240. The system of claim 234 wherein at least one of the resonate structures is a microsphere.

241. The system of claim 240 wherein each microsphere is between about 10 to 200 microns in diameter.

242. The system of claim 240 wherein at least one microsphere is less than about 10 microns.

243. The system of claim 234 wherein the signal absorbing material is a photochromic material.

244. The system of claim 243 wherein the photochromic material is bisthienylethene.

245. The system of claim 235 wherein at least one of the input and output waveguides is an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

246. The system of claim 245 wherein each optical fiber is tapered at the area of reduced cladding.

247. The system of claim 234 wherein each of the input and output waveguides is selected from the group consisting of an optical fiber, a tapered optical fiber, a semi-conductor waveguide, a photonic band gap waveguide and a photonic crystal waveguide.

248. A system to demultiplex and multiplex optical signals comprising:

"n" groups of "m" redundant optical filters, each of the "m" redundant optical filters in each of the "n": groups contains a WGM resonate structure which resonates in WGM for the same group of resonate signals;

an input waveguide fixed at a region proximate to each optical filter, whereby optical signal propagation from the input waveguide to the optical filter can occur;

a triggerable signal absorbing material within at least one of the a WGM resonate structures; and

"m" output waveguides each fixed at a region proximate to one of the "m" optical filters in each of the "n" groups.

249. The system of claim 248 further comprising a resonate structure-waveguide interface formed at each of the proximate regions.

250. The system of claim 249 further comprising a trigger consisting of an intense beam of light applied to at least one resonate structure which contains signal absorbing material.

251. The system of claim 250 wherein the intense beam of light is a laser beam.

252. The system of claim 251 further comprising at least one Mach-Zender interferometer to produce each laser beam.

253. The system of claim 248 wherein the resonate structure is selected from the group consisting of microspheres, stadiums, rings, hoops, oblate and prolate spheroids, and discs.

254. The system of claim 248 wherein at least one of the resonate structures is a microsphere.

255. The system of claim 254 wherein each microsphere is between about 10 to 200 microns in diameter.

256. The system of claim 254 wherein at least one microsphere is less than about 10 microns.

257. The system of claim 248 wherein the signal absorbing material is a photochromic material.

258. The system of claim 257 wherein the photochromic material is bisthienylethene.

259. The system of claim 249 wherein at least one of the input and output waveguides is an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

260. The system of claim 259 wherein each optical fiber is tapered at the area of reduced cladding.

261. The system of claim 248 wherein each of the input and output waveguides is selected from the group consisting of an optical fiber, a tapered optical fiber, a semi-conductor waveguide, a photonic band gap waveguide and a photonic crystal waveguide.

262. A method of switching "on/off" an optical filter comprising:

coupling an optical signal to a WGM resonate structure which contains a triggerable signal absorbing material;

coupling the optical signal from the WGM resonate structure to a secondary structure which supports signal propagation; and,

selectively applying a trigger to the signal absorbing material within the WGM resonate structure whereby the filter is switched "on/off" through disruption of WGM resonance caused by signal loss.

263. The method of claim 262 wherein the trigger is an intense beam of light directed at the resonate structure.

264. The method of claim 263 wherein the intense beam of light is a laser beam.

265. The method of claim 262 wherein the optical signal is within a channel within an optical telecommunications band.

266. The method of claim 262 wherein the secondary structure is an output waveguide.

267. The method of claim 266 the method further comprising adding an optical signal to the output waveguide.

268. A method to demultiplex optical signals:

providing optical signals of at least two different wavelengths within a single input waveguide, to at least two optical filters each containing a WGM resonate structure which resonates in WGM for a group of resonate signals;

coupling optical signals, which are the resonate signals for a WGM resonate structure, from the input waveguide to the corresponding optical filter;

selectively applying a trigger to a signal absorbing material in at least one WGM resonate structures, whereby a signal loss which disrupts the WGM resonance of that WGM resonate structure results; and

providing as output signals, from each optical filter in which WGM resonance has not been disrupted, the optical signals corresponding to its resonate signals.

269. The method of claim 268 the method further comprising providing the output signals of each optical filter to a separate output waveguide.

270. The method of claim 268 wherein the trigger is an intense beam of light.

271. A method to demultiplex optical signals:

providing optical signals of different wavelengths within a single input waveguide, to "n" groups of "m" redundant optical filters, each of the "m" redundant optical filters in each of the "n" groups contains a WGM resonate structure which resonates in WGM for the same group of resonate signals;

coupling optical signals, which are the resonate signals for a WGM resonate structure, from the input waveguide to the corresponding optical filters;

selectively applying a trigger to a signal absorbing material in at least one WGM resonate structures, whereby a signal loss which disrupts the WGM resonance of that WGM resonate structure results; and

providing as output signals, from each of the "m" optical filter in which WGM resonance has not been disrupted, the optical signals corresponding to its resonate signals.

272. The method of claim 271 wherein the trigger is an intense beam of light.

273. The method of claim 271 the method further comprising multiplexing the output signals by providing the "m" output waveguides, each waveguide being fixed proximate to one of the "m" optical filters in each of the "n" groups, whereby output signals from each of the "n" groups of optical filters may be coupled to one of the "m" output waveguides.

274. The optical filter of claim 217 wherein the signal absorbing material is selected from the group consisting of semi conductor nanoclusters, electrochromic nanocrystals, quantum dots, doped semi-conductor nanoclusters, liquid crystals, semi conductors, and dyes.

275. The optical filter of claim 217 wherein the signal absorbing material is selected from the group consisting of

dihydroindolizines, diarylimylenes, ScGe, bis-Mienylperfluorocyclopentenes, spiropyrens, and fulgides.

276. An optical filter comprising:

an input waveguide;

a first subfilter, which can switch a first group of resonate signals, fixed proximate to the input waveguide;

a second subfilter , which can switch a second group of resonate signals, one is also a resonate signal of the first subfilter, fixed proximate to the first subfilter; and

an output waveguide fixed proximate to the second subfilter.

277. The optical filter of claim 276 wherein the first and second subfilters each contain a WGM resonate structure.

278. The optical filter of claim 277 wherein each WGM resonate structure is a microsphere.

279. An optical filter comprising:

an input waveguide;

a first subfilter , which can switch a first group of resonate signals, fixed proximate to the input waveguide, whereby the first subfilter can receive optical signals travelling within the input waveguide;

a second subfilter which can switch a second group of resonate signals one of which is also a resonate signal of the first subfilter, fixed proximate to the first subfilter, whereby the second subfilter can receive optical signals from the first subfilter;

an output waveguide fixed proximate to the second subfilter; and

an "on/off" means for controlling at least one of the first and second subfilter.

280. An optical filter comprising:

an input waveguide;

an output waveguide;

a first WGM resonate structure which resonates in WGM for a first group of resonate signals fixed proximate to the input waveguide forming a first resonate structure-waveguide interface, whereby optical signal propagation of an evanescent wave from the input waveguide to the first resonate structure can occur;

a second WGM resonate structure which resonates in WGM for a second group of resonate signals, one of which is also a resonate signal of the first resonate structure, fixed proximate to the first resonate structure forming a direct optical-switch interface, whereby optical signal propagation from the first WGM resonate structure to the second WGM resonate structure can occur; and

a second resonate structure-waveguide interface formed between the second WGM resonate structure and the output waveguide, whereby optical signal propagation from the second WGM resonate structure to the output waveguide can occur.

281. The optical filter of claim 280 wherein each WGM resonate structure is selected from the group consisting of stadiums, rings, hoops, oblate and prolate spheroids, discs and microspheres.

282. The optical filter of claim 280 wherein at least one of the first and second WGM resonate structures is a microsphere.

283. The optical filter of claim 280 wherein the input and output waveguides are each an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

284. The optical filter of claim 280 further comprising:

a triggerable signal absorbing material within at least one of the WGM resonate structures; and

a trigger means for activating the signal absorbing material within at least one WGM resonate structure.

285. The optical filter of claim 284 wherein the trigger means is an intense beam of light directed at the resonate structure.

286. The optical filter of claim 285 wherein the intense beam of light is a laser beam.

287. The optical filter of claim 286 further comprising a Mach-Zender interferometer to produce the laser beam.

288. The optical filter of claim 280 further comprising a switching means for adjusting the index of refraction of at least one of the WGM resonate structures at one or more of the resonate structure waveguide interfaces.

289. The optical filter of claim 288 wherein the switching means is a pair of electrodes, each with a conductive contact lead, placed on either side of at least one of the WGM resonate structures.

290. The optical filter of claim 288 wherein the switching means is a laser beam directed at one or more of the WGM resonate structures.

291. The optical filter of claim 290 further comprising a Mach-Zender interferometer to produce the laser beam.

292. The optical filter of claim 289 further comprising a medium surrounding at least one of the resonate structure-waveguide interfaces and the direct optical-switch interface which is adjacent to a WGM resonate structure which has a pair of electrodes placed on either side.

293. The optical filter of claim 290 further comprising a medium surrounding at least one of the resonate structure-waveguide interfaces and the direct optical-switch interface which is adjacent to a resonate structure which has a laser beam directed at it.

294. The optical filter of claim 283 wherein at least one of the optical fibers is tapered.

295. The optical filter of claim 283 wherein at least one of the input and output waveguides is selected from the group consisting of a semi-conductor waveguide, a photonic band gap waveguide, or a photonic crystal waveguide.

296. An optical filter comprising:

an intermediary waveguide;

a first subfilter for a first group of resonate signals fixed proximate to an input waveguide and the intermediary waveguide; and

a second subfilter for a second specific group of resonate signals, one of which is also a resonate signal of the first optical switch, fixed proximate to the intermediary waveguide and an output waveguide.

297. An optical filter comprising:

an intermediary waveguide;

a first subfilter, which can switch a first group of resonate signals, fixed proximate to an input waveguide and the intermediary waveguide;

a second subfilter, which can switch a second group of resonate signals, one of which is also a resonate signal of the first group of resonate signals, fixed proximate to the intermediary waveguide and an output waveguide; and

an "on/off" switching means for controlling at least one of the subfilters.

298. An optical filter comprising:

an input waveguide;

an output waveguide;

an intermediary waveguide;

a first WGM resonate structure which resonates in WGM for a first group of resonate signals fixed proximate to the input waveguide forming a first resonate structure-waveguide interface which supports optical signal propagation from the input waveguide to the first dielectric WGM resonate structure;

a second WGM resonate structure-waveguide interface formed between the first WGM resonate structure and the intermediary waveguide which supports optical signal propagation from the first WGM resonate structure to the intermediary waveguide;

a second resonate structure which resonates in WGM for a second group of resonate signals, one of which is also a resonate signal of the first WGM resonate structure, fixed proximate to the intermediary waveguide forming a third resonate structure-waveguide interface which supports signal propagation from the intermediary waveguide to the second WGM resonate structure; and

a fourth resonate structure-waveguide interface formed between the second WGM resonate structure and the output waveguide which supports signal propagation from the second WGM resonate structure to the output waveguide.

299. The optical filter of claim 298 wherein the WGM resonate structures are each selected from the group consisting of stadiums, rings, hoops, oblate and prolate spheroids, discs and microspheres.

300. The optical filter of claim 298 wherein at least one of the first and second WGM resonate structures are microspheres.

301. The optical filter of claim 298 wherein the input and output waveguides are each an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

302. The optical filter of claim 298 wherein the intermediary waveguide is an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

303. The optical filter of claim 298 wherein the input, intermediary and output waveguides are optical fibers each with an area of reduced cladding at each resonate structure-waveguide interface.

304. The optical filter of claim 298 wherein at least one of the input, output and intermediary optical fibers are tapered.

305. The optical filter of claim 298 wherein at least one of the input, output and intermediary waveguides is selected from the group consisting of a semi-conductor waveguide, a photonic band gap waveguide, or a photonic crystal waveguide.

306. The optical filter of claim 298 further comprising a switching means for adjusting the index of refraction of at least one of the WGM resonate structures at one or more of the resonate structure waveguide interfaces.

307. The optical filter of claim 306 wherein the switching means is a pair of electrodes, each with a conductive contact lead, placed on either side of at least one of the WGM resonate structures.

308. The optical filter of claim 304 wherein the switching means is a laser beam directed at, at least one of the WGM resonate structures.

309. The optical filter of claim 308 further comprising a Mach-Zender interferometer to produce the laser beam.

310. The optical filter of claim 307 further comprising a medium surrounding at least one of the resonate structure-waveguide interfaces which is adjacent to each WGM resonate structure which has a pair of electrodes placed on either side.

311. The optical filter of claim 308 further comprising a medium surrounding at least one of the resonate structure-waveguide interfaces which is adjacent to each WGM resonate structure which has a laser beam directed at it.

312. An optical filter comprising:

a first resonate structure which can resonate in WGM for a first group of resonate signals; and

a second resonate structure, fixed proximate to the first resonate structure which can resonate in WGM for a second group of resonate signals one of which is also a resonate signal of the first WGM resonate structure.

313. An optical filter comprising:

a first WGM resonate structure which can resonate in WGM for a first group of resonate signals;

a second WGM resonate structure, fixed proximate to the first resonate structure which can resonate in WGM for a second group of resonate signals one of which is also a resonate signal of the first resonate structure; and

at least one additional resonate structure fixed proximate to the second resonate structure each of which can resonate in WGM for an additional group of resonate signals, one of which is the same resonate signal common to both the first and second resonate structures.

314. The optical filter of claim 312 wherein:

the first resonate structure is selected from the group consisting of stadiums, rings, hoops, oblate and prolate spheroids, discs and microspheres; and

the second resonate structure is selected from the group consisting of stadiums, rings, hoops, oblate and prolate spheroids, discs, microspheres, and resonate cavities.

315. A system to demultiplex different wavelength optical signals comprising:

at least two optical filters, each of which can filter for a different, wavelength optical signal;

an input waveguide fixed at a region proximate to all optical filters, whereby an optical signal can propagate from the input waveguide to the optical filters; and

a separate output waveguide, fixed at a region proximate to each optical filter, whereby optical signals can propagate from an optical filter to the proximate output waveguide.

316. The system of claim 315 further comprising:

at least two tertiary waveguides; and

an optical switch between each output waveguide and each tertiary waveguide, whereby optical signals can propagate from the optical switch to the tertiary waveguide.

317. The system of claim 316 further comprising an "on/off" switching means which can be applied to at least one of the optical switches.

318. The system of claim 316 wherein each optical switch comprises a resonate structure which is fixed proximate to the output waveguide and the tertiary waveguide.

319. The system of claim 316 wherein each optical switch comprises a wavelength specific resonate structure which is fixed at a region proximate to the output waveguide and the tertiary waveguide.

320. The system of claim 318 wherein the resonate structures are selected from the group consisting of stadiums, rings, hoops, oblate and prolate spheroids, discs, microspheres, or resonate cavities.

321. The system of claim 318 further comprising an electronic switching means to adjust the index of refraction of the resonate structure within at least one optical switch.

322. The system of claim 321 wherein the electronic switching means comprises:

a pair of electrodes, each with a conductive lead, placed on either side of the at least one resonant structure, whereby electrical power can pass across the resonate structure; and

a controller attached to the conductive leads, whereby the flow of electricity to the conductive leads can be selected.

323. The system of claim 318 further comprising an optical switching means for adjusting the index of refraction of the resonate structure within at least one optical switch.

324. The system of claim 323 wherein the optical switching means is a laser beam directed at the resonate structure within the at least one optical switch.

325. The system of claim 318 further comprising:

a triggerable signal absorbing material within at least one resonate structures; and

a trigger means for activating the signal absorbing material within the at least one resonate structure.

326. The system of claim 316 further comprising:

an electronic switching means which can be applied to at least one of the optical switches; and

an optical switching means which can be applied to at least one of the optical switches.

327. The system of claim 317 further comprising a medium with an known index of refraction surrounding at least one of the regions where at least one optical switch is fixed proximate to a tertiary or output waveguide.

328. The system of claim 327 wherein the medium is selected from the group consisting of air, plastic, or water.

329. A system to demultiplex different wavelength optical signals comprising:

"n" gate keeper subfilters;

an input waveguide fixed at a region proximate to all the "n" gate keeper subfilters;

"n" intermediary waveguides, each fixed proximate to one of the "n" gate keeper subfilters;

"n" groups of "m" isolator subfilters, each group of "m" isolator subfilters filter for the same resonate signals, fixed at a region proximate to each intermediary waveguide; and

"m" output waveguides each fixed at a region proximate to one of the "m" isolator subfilters from each of the "n" groups of isolator subfilters.

330. The system of claim 329 further comprising an "on/off" control means which can be applied to at least one of the subfilters.

331. The system of claim 330 wherein each subfilter contains a WGM resonate structure.

332. The system of claim 331 wherein the "on/off" control means is an electronic WGM control comprising:

a pair of electrodes, each with a conductive lead, placed on either side of the WGM resonate structure of the at least one subfilter, whereby electrical power can pass across the WGM resonate structure; and

a controller attached to the conductive leads, whereby the flow of electricity to the conductive leads can be selected.

333. The system of claim 331 wherein the "on/off" control means is an optical WGM control, comprising a laser beam directed at the WGM resonate structure within the at least one subfilter.

334. The system of claim 333 further comprising at least one Mach-Zender interferometer to produce each laser beam.

335. The system of claim 331 wherein the "on/off" control means is through signal loss control.

336. The system of claim 335 wherein the signal loss control comprises:

a triggerable signal absorbing material within at least one WGM resonate structure; and

a trigger means for activating the signal absorbing material within the WGM resonate structure.

337. The system of claim 331 further comprising:

WGM control means which can be applied to at least one of the subfilters; and

a signal loss control means which can be applied to at least one of the subfilters.

338. The system of claim 332 further comprising a medium with a known index of refraction surrounding at least one of the regions where at least one WGM resonate structure is fixed proximate to an input, intermediary or output waveguide.

339. The system of claim 333 further comprising a medium with an known index of refraction surrounding at least one of the regions where at least one WGM resonate structure is fixed proximate to an input, intermediary or output waveguide.

340. A method of optical filtering comprising:

providing optical signals of at least two different wavelengths to a first subfilter;

coupling the signals which are resonate signals of the first subfilter to the first subfilter;

coupling a single resonate signal from the first subfilter to a second subfilter; and

coupling the single resonate signal to a secondary structure.

341. A method of optical filtering comprising:

providing a plurality of optical signals to a first subfilter;

coupling the resonate signals which are resonate signals of the first subfilter to the first subfilter;

coupling a single resonate signal from the first subfilter to a second subfilter; and

coupling the single resonate signal to an output waveguide.

342. The method of claim 341 wherein the resonate signal is provided to the second subfilter by direct coupling with the first subfilter.

343. The method of claim 341 wherein the resonate signal is provided to the second subfilter by indirect coupling with the first subfilter.

344. The method of claim 343 the method further comprising:

coupling the resonate signals from the first subfilter to an intermediary waveguide; and

coupling a resonate signal from the intermediary waveguide to the second subfilter.

345. The method of claim 340 the method further comprising applying a WGM control to switch “on/off” at least one subfilter.

346. The method of claim 340 the method further comprising applying a signal loss control to switch “on/off” at least one subfilter.

347. The method of claim 341 the method further comprising applying a WGM control to switch “on/off” at least one subfilter.

348. The method of claim 341 the method further comprising applying a signal loss control to switch “on/off” at least one subfilter.

349. A method of optical filtering comprising:

providing optical signals of at least two different wavelengths to a first WGM resonate structure;

coupling the optical signals which the first WGM resonate structure resonates for to the first WGM resonate structure;

coupling a single resonate signal from the first WGM resonate structure to a second WGM resonate structure; and

coupling the single resonate signal from the second WGM resonate structure to a waveguide.

350. The method of claim 349 wherein at least one of the WGM resonate structures is a microsphere.

351. The method of claim 349 the method further comprising providing the optical signals within a waveguide.

352. The method of claim 349 wherein the optical signals are within a channel within an optical telecommunications band.

353. The method of claim 349 the method further comprising applying a WGM control to switch "on/off" the WGM resonance of at least one of the WGM resonate structures.

354. The method of claim 353 wherein the WGM control is to adjust the index of refraction of a WGM resonate structure to substantially match the index of refraction of a medium surrounding at least the portion of the WGM resonate structure where coupling occurs.

355. The method of claim 353 wherein the WGM control is to adjust the index of refraction of a WGM resonate structure to not substantially match the index of refraction of a medium surrounding the portions of the WGM resonate structure where coupling occurs.

356. The method of claim 349 the method further comprising applying a signal loss control to switch "on/off" the WGM resonance of at least one of the WGM resonate structures.

357. A method of optical filtering comprising:

providing optical signals of at least two different wavelengths to a first WGM resonate structure;

coupling the optical signals which the first WGM resonate structure resonates for to the first WGM resonate structure;

coupling the optical signals from the first WGM resonate structure to an intermediary waveguide; and

coupling a single optical signal from the intermediary waveguide to a second WGM resonate structure.

358. The method of claim 357 the method further comprising coupling the single optical signal to an output waveguide.

359. The method of claim 357 wherein at least one of the WGM resonate structures is a microsphere.

360. The method of claim 357 the method further comprising providing the optical signals within a waveguide.

361. The method of claim 357 wherein the optical signals are within a channel within an optical telecommunications band.

362. The method of claim 357 the method further comprising applying a WGM control to switch "on/off" the WGM resonance of at least one of the WGM resonate structures.

363. The method of claim 362 wherein the WGM control is to adjust the index of refraction of at least one WGM resonate structure relative to the index of refraction of a medium surrounding at least one region where signal coupling to or from the at least one WGM resonate structure occurs.

364. The method of claim 359 the method further comprising applying a signal loss control to the WGM resonate structure, whereby the WGM resonance of the WGM resonate structure is disrupted by signal loss.

365. A method to demultiplex different wavelength optical signals comprising:

providing optical signals of at least two different wavelengths within an input waveguide, to at least two wavelength specific optical filters each of which selects for a group of resonate signals;

coupling optical signals, which are the resonate signals for a WGM resonate structure, from the input waveguide to the corresponding optical filter; and

providing as output from each optical filter a signal of a specific wavelength.

366. The method of claim 365 the method further comprising coupling each specific wavelength output signal to a separate output waveguide.

367. A method to demultiplex different wavelength optical signals comprising:

providing optical signals of at least two different wavelengths within an input waveguide, to at least two wavelength specific optical filters each of which selects for a group of resonate signals;

coupling optical signals, which are the resonate signals for a WGM resonate structure, from the input waveguide to the corresponding optical filter;

providing as output from each optical filter a signal of a specific wavelength;

coupling each specific wavelength output signal to a separate output waveguide;

coupling the specific wavelength output signal from each output waveguide to "m" optical switches; and

providing as output from each optical switch the specific wavelength output signal.

368. The method of claim 367 wherein each optical switch contains a WGM resonate structure.

369. The method of claim 367 the method further comprising switching the specific wavelength output signal from at least one optical switch to at least one tertiary waveguide.

370. The method of claim 368 the method further comprising applying a WGM control to at least one optical switch.

371. The method of claim 370 wherein the WGM control is to adjust the index of refraction of the WGM resonate structure within the optical switch.

372. The method of claim 370 wherein the WGM control is applied electronically by passing a flow of electricity across the WGM resonate structure within the optical switch.

373. The method of claim 370 wherein the WGM control is applied optically by directing an intense beam of light at the WGM resonate structure within the optical switch.

374. An optical filter comprising:

an input waveguide;

an intermediary waveguide;

an output waveguide;

a first subfilter for a first group of resonate signals fixed proximate to the input waveguide and the intermediary waveguide; and

a second subfilter for a second specific group of resonate signals, one of which is also a resonate signal of the first optical switch, fixed proximate to the intermediary waveguide and the output waveguide.

375. An optical filter comprising:

an input waveguide;

an intermediary waveguide;

an output waveguide;

a first subfilter, which can switch a first group of resonate signals, fixed proximate to the input waveguide and the intermediary waveguide;

a second subfilter, which can switch a second group of resonate signals, one of which is also a resonate signal of the first group of resonate signals, fixed proximate to the intermediary waveguide and the output waveguide; and

an "on/off" switching means for controlling at least one of the subfilters.

376. An optical filter comprising:

an input waveguide;

a secondary structure which supports signal propagation;

a WGM resonate structure fixed at a region proximate to the input waveguide and the secondary structure;

a resonate structure-waveguide interface formed at each of the proximate regions,

a medium surrounding at least a portion of the WGM resonate structure at one of the resonate structure-waveguide interfaces; and

an "on/off" means for adjusting the index of refraction of at least that portion of the WGM resonate structure surrounded by medium.

377. The optical filter of claim 376 wherein the WGM resonate structure is a microsphere.

378. The optical filter of claim 377 wherein the diameter of the microsphere is between about 10 and 500 microns.

379. The optical filter of claim 377 wherein the diameter of the microsphere is between about 10 and about 250 microns.

380. The optical filter of claim 377 wherein the diameter of the microsphere is between about 10 and 200 microns.

381. The optical filter of claim 376 wherein the medium is selected from the group consisting of water, plastic, or air.

382. The optical filter of claim 376 wherein the WGM resonate structure is selected from the group consisting of stadiums, rings, hoops, oblate and prolate spheroids, discs or microspheres.

383. The optical filter of claim 376 wherein the secondary structure is selected from the group consisting of a waveguide, an optical fiber, a tapered optical fiber, a semi-conductor waveguide, a photonic band gap waveguide, a photonic crystal waveguide or a WGM resonate structure.

384. The optical filter of claim 376 wherein the "on/off" means is electrical, comprising a pair of electrodes each with a conductive lead, placed on either side of the microsphere.

385. The optical filter of claim 376 wherein the "on/off" means is optical, comprising an intense beam of light directed at the WGM resonate structure.

386. The optical filter of claim 385 wherein the intense beam of light is a laser beam.

387. The optical filter of claim 386 further comprising a Mach-Zender interferometer to generate the laser beam.

388. The optical filter of claim 377 further comprising an optically active material coating the microsphere whereby the index of refraction of the optically active material is the index of refraction of the resonate structure for purposes of adjusting the index of refraction of the resonate structure.

389. The optical filter of claim 388 wherein the optically active material is selected from the group consisting of molecules of liquid crystal, organic photorefractive polymers, GaAs, Nitrabenzene and $LiNbO_3$.

390. An optical filter comprising:

an optical fiber;

an area of reduced cladding on the optical fiber;

a secondary structure which supports signal propagation;

a WGM microsphere fixed at a region proximate to the area of reduced cladding and to the secondary structure;

a resonate structure-waveguide interface formed at each proximate region;

a medium, with a known index of refraction, surrounding at least a portion of the WGM microsphere at one or more of the resonate structure-waveguide interfaces;

a pair of electrodes each with a conductive contact lead, placed on either side of the WGM microsphere; and

a controller attached to the conductive leads whereby the flow of electricity to the conductive leads can be selected.

391. A system to demultiplex optical signals:

"n" groups of optical filters, each of which contains a WGM resonate structure which resonates in WGM for a different group of resonate signals;

an input waveguide fixed at a region proximate to each of the "n" optical filters, whereby optical signals can propagate from the input waveguide to the optical filter;

"n" output waveguides each fixed at a region proximate to one of the "n" optical filters, whereby optical signals can propagate from an optical filter to an output waveguide;

a medium partially surrounding at least one of the WGM resonate structures at a proximate region; and

an "on/off" means for adjusting the index of refraction of the WGM resonate structure applied to at least one of the WGM resonate structures partially surrounded by medium, whereby the index of refraction of the WGM resonate structure at a proximate region can be adjusted to be substantially equal to the index of refraction of the medium.

392. The system of claim 391 further comprising a resonate structure-waveguide interface formed at each of the proximate regions.

393. The system of claim 391 wherein the "on/off" means to adjust the index of refraction is electrical.

394. The system of claim 393 the electrical "on/off" means for this comprising:

a pair of electrodes each with a conductive lead, placed on either side of the at least one WGM at resonant structure, whereby electrical power can pass across the resonate structure; and

a controller attached to the conductive leads, whereby the flow of electricity to the conductive leads can be selected.

395. The system of claim 391 wherein the "on/off" means to adjust the index of refraction is optical.

396. The system of claim 395, the optical "on/off" means further comprising a laser beam directed at the at least one WGM resonate structure .

397. The system of claim 396 further comprising at least one Mach-Zender interferometer to produce each laser beam.

398. The system of claim 391 wherein the medium is selected from the group consisting of water, plastic, or air.

399. The system of claim 391 wherein at least one of the resonate structures is a microsphere.

400. The system of claim 392 wherein at least one of the input and output waveguides is an optical fiber with an area of reduced cladding at each resonate structure-waveguide interface.

401. The system of claim 400 wherein each optical fiber is tapered at the area of reduced cladding.

402. The system of claim 391 wherein each of the input and output waveguides is selected from the group consisting of an optical fiber, a tapered optical fiber, a semi-conductor waveguide, a photonic band gap waveguide or a photonic crystal waveguide.

403. A system to demultiplex and multiplex optical signals comprising:

"n" groups of "m" redundant optical filters, each of the "m" redundant optical filters in each of the "n" groups contains a WGM resonate structure which resonates in WGM for the same group of resonate signals;

an input waveguide fixed at a region proximate to each optical filter, whereby optical signals can propagate from the input waveguide to the optical filter;

a medium partially surrounding at least one WGM resonate structure at a proximate region;

an "on/off" means which can be applied to at least one of the WGM resonate structures partially surrounded by medium, whereby the index of refraction of the WGM resonate structure at a proximate region can be adjusted to be substantially equal to the index of refraction of the medium; and

"m" output waveguides each fixed at a region proximate to one of the "m" optical filters in each of the "n" groups.

404. A method of switching "on/off" an optical filter comprising:

coupling optical signals, which are the resonate signals of a WGM resonate structure that is at least partially surrounded by a medium at one or more region where signal coupling can occur;

coupling the optical signal from the WGM resonate structure to a secondary structure which supports signal propagation; and

selectively applying a WGM control to the WGM resonate structure whereby the filter is switched "off" by adjusting the index of refraction of the WGM resonate structure to substantially equal the index of refraction of the medium at one or more of the regions where signal coupling occurs.

405. The method of claim 404 wherein the WGM control is polarization of at least a portion of the resonate structure.

406. The method of claim 405 wherein the polarization is caused by passing electrical power across the resonate structure.

407. The method of claim 405 wherein the polarization is produced by directing an intense beam of light at the resonate structure.

408. The method of claim 404 the method further comprising supplying the optical signals within a waveguide.

409. The method of claim 408 wherein the optical signals are within an optical telecommunications band.

410. The method of claim 390 wherein the secondary structure is an output waveguide.

411. The method of claim 399 the method further comprising adding the optical signals to the output waveguide.

412. A method to demultiplex optical signals:

providing optical signals of at least two different wavelengths within a single input waveguide to at least two optical filters each containing a WGM resonate structure, at least one of which is at least partially surrounded by a medium at one or more regions where signal coupling can occur;

coupling optical signals, which are the resonate signals for a WGM resonate structure, from the input waveguide to the corresponding optical filter;

selectively adjusting the index of refraction of at least one of the WGM resonate structures partially surrounded by medium, whereby the optical filter is switched "off" by adjusting the index of refraction of the WGM resonate structure to substantially equal the index of refraction of the medium at one or more of the regions where signal coupling occurs; and

providing as output signals, from each optical filter in which WGM resonance has not been switched "off", the optical signals corresponding to the wavelengths of its resonate signals.

413. The method of claim 412 the method further comprising providing each of the output signals of each optical filter to a separate output waveguide.

414. A method to demultiplex optical signals:

providing "n" optical signals of different wavelengths within a single input waveguide to "n" groups of "m" redundant optical filters, each of the "m" redundant optical filters in each of the "n" groups contains a WGM resonate structure which resonates in WGM for the same resonant signals and at least one of the WGM resonate structures is at least partially surrounded by a medium at one or more region where signal coupling can occur;

coupling optical signals, which are the resonate signals for a WGM resonate structure, from the input waveguide to the corresponding optical filter;

selectively adjusting the index of refraction of at least one of the WGM resonate structures partially surrounded by medium, whereby the optical filter is switched "off" by adjusting the index of refraction of the WGM resonate structure to substantially equal the index of refraction of the medium at one or more of the regions where signal coupling occurs; and

providing as output signals, from each of the "m" optical filters in which WGM resonance has not been switched "off ", the optical signals corresponding to the wavelengths of its resonate signals.

415. The method of claim 412 the method further comprising multiplexing the output signals by providing "m" output waveguides, each waveguide being fixed proximate to one of the "m" optical filters in each of the "n" groups, whereby output signals from each of the "n" groups of optical filters may be coupled to one of the "m" output waveguides.

416. An optical filter comprising:

a WGM resonate structure with a first proximate region to couple to one or more input signals;

a second proximate region of the WGM resonate structure to provide one or more output signals;

a medium surrounding at least one of the first and second proximate regions; and

an "on/off" control means for adjusting the index of refraction of the WGM resonate structure at one or more of the first and second proximate regions.

417. The optical filter according to claim 147, wherein said "on/off" switching means comprises:

a binding agent on said WGM resonate structure; and

an analyte in a sample which is exposed to said binding agent;

wherein when said analyte binds with said binding agent on said WGM resonate structure, one of a change in frequency, attenuation and destruction of an optical signal is detected which triggers said "on/off" switching means.

418. The optical filter according to claim 417, wherein said binding agent and said analyte are provided in pairs, and said binding agent/analyte pairs include: antigen/antibody, antibody/antigen, ligand/receptor, receptor/ligand, nucleic acid/nucleic acid.

419. The optical filter according to claim 417, wherein said binding agent and said analyte include complexing agents, chelating agents, and chemical bonding agents.

420. The optical filter according to claim 147, wherein said "on/off" switching means comprises:

a binding agent bound to an analyte on said WGM resonate structure; and

a sample which is exposed to said WGM resonate structure;

wherein said analyte is competed away from being bound to said binding agent when exposed to said sample, resulting in detection of said analyte by one of a change in frequency, attenuation and destruction of an optical signal, which triggers said "on/off" switching means.

421. The optical filter according to claim 420, wherein said binding agent and said analyte are provided in pairs, and said binding agent/analyte pairs include: antigen/antibody, antibody/antigen, ligand/receptor, receptor/ligand, nucleic acid/nucleic acid.

422. The optical filter according to claim 420, wherein said binding agent and said analyte include complexing agents, chelating agents, and chemical bonding agents.

423. A method of switching "on/off" an optical filter, comprising:

coupling an optical signal to a WGM resonate structure having a binding agent thereon;

coupling the optical signal from said WGM resonate structure to a secondary structure which supports signal propagation; and

detecting a presence of an analyte by one of a change in frequency, attenuation, and destruction of said optical signal to trigger switching of said "on/off" optical filter.

424. The method according to claim 423, wherein said detection of said analyte results when a binding agent on said WGM resonate structure is exposed to said analyte.

425. The method according to claim 423, wherein said detection of said analyte results when a sample is exposed to said WGM resonate structure, and said analyte is competed away from being bound to a binding agent on said WGM resonate structure.

426. The method according to claim 424, wherein said binding agent and said analyte are provided in pairs, and said binding agent/analyte pairs include: antigen/antibody, antibody/antigen, ligand/receptor, receptor/ligand, nucleic acid/nucleic acid.

426. The method according to claim 424, wherein said binding agent and said analyte include complexing agents, chelating agents, and chemical bonding agents.

427. The method according to claim 425, wherein said binding agent and said analyte are provided in pairs, and said binding agent/analyte pairs include: antigen/antibody, antibody/antigen, ligand/receptor, receptor/ligand, nucleic acid/nucleic acid.

428. The method according to claim 425, wherein said binding agent and said analyte include complexing agents, chelating agents, and chemical bonding agents.